

### CLAIMS

The following claims are pending and not amended:

1. (Previously Presented) A method for transmitting a biorthogonal frequency division multiplex/offset modulation (BFDOM) biorthogonal multicarrier signal wherein the method implements a transmultiplexer structure providing:

a modulation step, by a bank of synthesis filters, said bank of synthesis filters having  $2M$  parallel branches, wherein  $M$  is an integer parameter,  $M \geq 2$ , each branch of the bank of synthesis filters being fed by source data and each comprising an expander of order  $M$  and a synthesis filter; and

a demodulation step, by a bank of analysis filters, said bank of analysis filters having  $2M$  parallel branches, each branch of the bank of analysis filters comprising a decimator of order  $M$  and an analysis filter, and delivering representative data received from said source data,

said synthesis filters and analysis filters being derived from a predetermined prototype modulation function.

2. (Previously Presented) The transmission method according to claim 1, wherein said bank of synthesis filters and/or of said bank of analysis filters are grouped as a polyphase matrix, respectively.

3. (Previously Presented) The transmission method according to claim 2, wherein at least one of said polyphase matrices comprises a reverse Fourier transform with  $2M$  inputs and  $2M$  outputs.

4. (Previously Presented) The modulating method according to claim 12, wherein the method implements a reverse Fourier transform fed by  $2M$  source data, each having undergone a predetermined phase shift, and feeding  $2M$  filtering modules, each followed by an expander of

order  $M$ , the outputs of which are grouped then transmitted.

5. (Previously Presented) The modulation method according to claim 4, wherein the method delivers data  $s[k]$  such that:

$$\begin{aligned}
 x_m^n(n) &= a_{m,n} e^{j\frac{\pi}{2}n} \\
 x_l^1(n) &= \sqrt{2} \sum_{k=0}^{2M-1} x_k^0(n) e^{j\frac{2\pi}{2M}k\frac{D-M}{2}} e^{j\frac{2\pi}{2M}kl} \\
 &= 2M\sqrt{2}IFFT\left(x_0^0, \dots, x_{2M-1}^0(n) e^{-j\frac{2\pi}{2M}(2M-1)\frac{D-M}{2}}\right)[l] \\
 x_l^2(n) &= \sum_{k=0}^{m-1} p(l+2kM)x_k^1(n-2k) \\
 s[k] &= \sum_{n=\lfloor \frac{k}{M} \rfloor - 1}^{\lfloor \frac{k}{M} \rfloor} x_{k-nM}^2(n)
 \end{aligned}$$

wherein  $D = \alpha M - \beta$ ,

with  $\alpha$  an integer representing the reconstruction delay;

$\beta$  an integer between 0 and  $M-1$ ;

and  $[\cdot]$  is the "integral part" function.

6. (Previously Presented) The demodulating method according to claim 15, wherein the method implements a reverse Fourier transform fed by  $2M$  branches, themselves fed by said transmitted signal, and each comprising a decimator of order  $M$  followed by a filtering module, and feeding  $2M$  phase shift multipliers, delivering an estimation of the source data.

7. (Previously Presented) The demodulation method according to claim 6, wherein the method delivers data  $\hat{a}_{m,n-\alpha}$  such that:

$$\hat{x}_l^{i2}(n-\alpha) = s[nM - \beta - l]$$

$$\hat{x}_l^{i1}(n-\alpha) = \sum_{k=0}^{n-1} p(l+2kM)\hat{x}_l^{i2}(n-\alpha-2k)$$

$$\begin{aligned}\hat{x}_l^{i0}(n-\alpha) &= \sqrt{2}e^{-j\frac{2\pi}{2M}l\frac{D+M}{2}} \sum_{k=0}^{2M-1} \hat{x}_l^{i1}(n-\alpha)e^{j\frac{2\pi}{2M}kl} \\ &= 2M\sqrt{2}e^{-j\frac{2\pi}{2M}l\frac{D+M}{2}} IFFT(\hat{x}_l^{i1}(n-\alpha), \dots, \hat{x}_{2M-1}^{i1}(n-\alpha))[l]\end{aligned}$$

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$$\hat{a}_{m,n-\alpha} = \Re \left\{ e^{-j\frac{\pi}{2}(n-\alpha)} x_l^{i0}(n-\alpha) \right\}$$

with:  $D = 2.s.M + d$ ,  
 wherein:  $s$  is an integer;  
 $d$  is between 0 and  $2M-1$ .

8. (Previously Presented) The demodulation method according to claim 15, wherein said filtering modules are produced as one of the filters belonging to the group comprising:

transverse structure filters;  
 ladder structure filters; and  
 trellis structure filters.

9. (Previously Presented) The modulation method according to claim 15, wherein said

biorthogonal multicarrier signal comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

10. (Canceled).

11. (Previously Presented) The method according to claim 1, wherein said biorthogonal multicarrier signal comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

12. (Previously Presented) A method comprising modulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal, wherein the method implements a bank of synthesis filters having  $2M$  parallel branches, wherein  $M$  is an integer parameter and  $M \geq 2$ , each branch of synthesis filters being fed by source data and each comprising an expander of order  $M$  and a synthesis filter, which is derived from a predetermined prototype modulation function.

13. (Previously Presented) The modulation method according to claim 12, wherein said filtering modules are produced as one of the filters belonging to the group comprising:

- transverse structure filters;
- ladder structure filters; and
- trellis structure filters.

14. (Previously Presented) The method according to claim 12, wherein said biorthogonal multicarrier signal comprises an orthogonal frequency division multiplex/offset modulation (OFDM/OM) signal.

15. (Previously Presented) A method comprising demodulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal wherein the method

implements a bank of analysis filters having  $2M$  parallel branches, wherein  $M$  is an integer parameter and  $M \geq 2$ , each branch of analysis filters comprising a decimator of order  $M$  and an analysis filter, and delivering representative data received from source data, said analysis filter being derived from a predetermined prototype modulation function.

16. (Previously Presented) Apparatus comprising:

a modulating device for modulating a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal, comprising a bank of synthesis filters having  $2M$  parallel branches, wherein  $M$  is an integer parameter and  $M \geq 2$ , each branch of synthesis filters being fed by source data and each comprising an expander of order  $M$  and a synthesis filter, which is derived from a predetermined prototype modulation function.

17. (Previously Presented) The apparatus according to claim 16, wherein the modulating device implements a reverse Fourier transform fed by  $2M$  source data, each having undergone a predetermined phase shift, and feeding  $2M$  filtering modules, each following by an expander of order  $M$ , the outputs of which are grouped then transmitted.

18. (Previously Presented) The apparatus according to claim 16, further including a demodulation device for demodulating a BFDM/OM biorthogonal multicarrier signal and comprising:

a bank of analysis filters having  $2M$  parallel branches, each branch of analysis filters comprising a decimator of order  $M$  and an analysis filter, and delivering representative data received from source data, said analysis filter being derived from a predetermined prototype modulation function.

19. (Previously Presented) The apparatus according to claim 18, wherein the demodulation device implements a reverse Fourier transform fed by  $2M$  branches, themselves fed by said transmitted signal, and each comprising a decimator of order  $M$  followed by a filtering module, and feeding  $2M$  phase shift multipliers, delivering an estimation of the source data.

20. (Previously Presented) A demodulation device for demodulation a biorthogonal frequency division multiplex/offset modulation (BFDM/OM) biorthogonal multicarrier signal comprising:

a bank of analysis filters having  $2M$  parallel branches, each branch of the bank of analysis filters comprising decimator of order  $M$  and an analysis filter, and delivering representative data received from source data, said analysis filter being derived from a predetermined prototype modulation function.

21. (Previously Presented) The demodulation device according to claim 20, further wherein the device implements a reverse Fourier transform fed by  $2M$  branches, themselves fed by said transmitted signal, and each comprising a decimator of order  $M$  followed by a filtering module, and feeding  $2M$  phase shift multipliers, delivering an estimation of the source data.